

Changes in the incidence of acute gonococcal and nongonococcal salpingitis

A five-year study from an urban area of central Sweden

LARS FORSLIN, VIKING FALK, AND DAN DANIELSSON

From the Department of Obstetrics and Gynaecology, and the Department of Clinical Bacteriology and Immunology, Central County Hospital, S-701 85 Örebro, Sweden

SUMMARY The incidence of acute gonococcal and nongonococcal salpingitis for a five-year-period (1970-74) was studied retrospectively in an urban area of central Sweden. The investigation was undertaken to see if the reported decrease of gonorrhoea in Sweden had been followed by a change in the incidence of gonococcal salpingitis—the most common complication of gonorrhoea. The study showed that the relative incidence of acute gonococcal salpingitis had decreased even more than urogenital gonorrhoea and these findings thus indicate a real decrease of gonorrhoea. At the same time there were more patients with nongonococcal salpingitis. During the period of the study the gonococcal complement-fixation test (GCFT) gave positive results in 40% to 80% of the patients with gonococcal salpingitis. The yield with this test was only 4% in patients with nongonococcal salpingitis during 1970 but it increased successively and was 23% in 1974. This increase was statistically highly significant ($P < 0.001$).

Introduction

In the last 15 years there has been a steady increase in the incidence of gonorrhoea and an increase of as much as 15% each year was reported from USA and Sweden during the late 1960s. This trend continued in USA during the early 1970s (Wiesner and Holmes, 1975). A similar situation was described from Denmark and the United Kingdom but a levelling off has now been reported (Catterall, 1975; Juhlin, 1975; Morton, 1975). In Sweden, however, a pronounced decrease took place in 1971-72 and this continued during the next four years with figures in 1976 corresponding with those reported in 1965 (Juhlin, 1975; Kallings and Moberg, 1977).

The reasons for this decrease are not clear. Under-reporting by doctors is one explanation, but this has not been substantiated. If this were true the relative incidence of complications would increase. We therefore tested this hypothesis by studying the incidence of acute salpingitis with concomitant urogenital gonorrhoea, so-called gonococcal salpingitis, which several investigations have

shown to be the most common complication of urogenital gonorrhoea. The incidence in the United Kingdom has been reported as being between 10 and 15% (Rees and Annels, 1969) and a similar incidence has been reported in various areas of Sweden during the 1950s and 1960s (Gisslén *et al.*, 1961; Falk, 1965; Mårdh and Weström, 1970; Danielsson *et al.*, 1975). Acute salpingitis without concomitant urogenital gonorrhoea is called nongonococcal salpingitis.

We made a retrospective investigation of the incidence of acute gonococcal and nongonococcal salpingitis during the period 1970-74 in the district of Örebro city, an urban area of central Sweden. We found that the relative incidence of acute gonococcal salpingitis decreased even more than urogenital gonorrhoea. At the same time more patients had nongonococcal salpingitis.

Material and methods

PATIENTS AND DIAGNOSTIC CRITERIA

The study comprised 666 inpatients from the Department of Gynaecology, Central County Hospital, Örebro, Sweden, in whom acute salpingitis had been diagnosed. During the period 1970-74 any patient attending the hospital with a suspected

Address for reprints: Lars Forslin, Department of Obstetrics and Gynaecology, Central County Hospital, S701 85 Örebro, Sweden

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diagnosis of acute salpingitis was routinely admitted to hospital.

The diagnostic criteria were:

A history of low abdominal pain with palpable adnexal mass and at least two of the following symptoms: vaginal discharge, menstrual irregularity, dysuria, temperature $>38^{\circ}\text{C}$, and an erythrocyte sedimentation rate >15 mm/1st hour. The physical examination was carried out and the presence of a palpable adnexal mass was confirmed by one or two senior physicians on the morning of the day after the patient had been admitted to hospital. In 447 (67.1%) of the patients a diagnosis of acute salpingitis was confirmed by visual inspection by laparoscopy using the criteria laid down by Jacobson and Weström (1969). Laparoscopy was used on any patient in whom the diagnosis was uncertain on clinical grounds. Anyone who did not fulfil the criteria or who gave negative results on laparoscopy was excluded.

BACTERIOLOGY AND SEROLOGY

On the day the patient was admitted to hospital, or on the morning of the next day when the patient was again examined, specimens for culture of gonococci were taken from the urethra, cervical os, and the rectal mucosa with charcoal-treated cotton swabs and transported to the laboratory in modified Stuart's transport medium (Gästrin and Kallings, 1968). On arrival at the laboratory (within 4–16 hours) the specimens were cultured on selective and nonselective gonococcal culture media and then *Neisseria gonorrhoeae* were isolated and identified as earlier described (Danielsson and Johannisson, 1973).

A serum specimen was taken from each patient within one day of admission to the hospital. A second serum specimen was obtained between two and three weeks later from 80% of the patients. The sera were tested for gonococcal antibodies using the micromodification of the Laboratory Branch Complement Fixation (LBCF) test as described elsewhere (Danielsson *et al.*, 1972). This technique has been used in our laboratory for the last nine years, and a titre of $>1:5$ is regarded as positive.

Statistical analysis

The hypothesis was tested by the χ^2 test. The following terms were used: $P < 0.001$ difference highly significant; $0.001 < P < 0.01$, difference significant; $0.01 < P < 0.05$, difference almost significant.

Results

AGE DISTRIBUTION OF PATIENTS WITH ACUTE SALPINGITIS AND THE INCIDENCE OF UROGENITAL GONORRHOEA

The Figure shows the age distribution of the patients with acute salpingitis with or without concomitant urogenital gonorrhoea. It will be seen that most cases were in patients aged between 15 and 24 years. There were, however, more patients aged between 30 and 34 years during 1973–74 compared with 1970–71, but this increase was not statistically significant.

The total number of patients with acute salpingitis was relatively constant in our particular area of central Sweden during 1970–73 with an increase in 1974 (Figure and Table 1). However, the number of

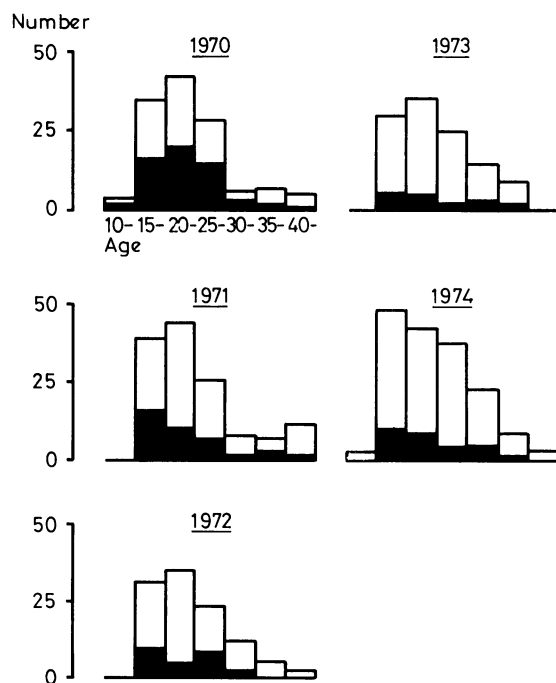


Table 1 The incidence of urogenital gonorrhoea in patients admitted to hospital with acute salpingitis

Year	Acute salpingitis			Probability (1970)
	Total No.	With gonorrhoea No.	%	
1970	126	54	42.9	—
1971	139	38	27.3	$P < 0.01$
1972	111	24	21.6	$P < 0.001$
1973	113	18	15.9	$P < 0.001$
1974	177	30	16.9	$P < 0.001$

patients with acute salpingitis with concomitant urogenital gonorrhoea decreased to a significant extent compared with those without gonorrhoea. Table 1 shows that the incidence of urogenital gonorrhoea was 42.9% in these patients in 1970 which is in agreement with earlier reports (Falk, 1965; Danielsson *et al.*, 1975) but it was only 15.9% and 16.9% respectively in 1973 and 1974 ($P < 0.001$).

EPIDEMIOLOGICAL SITUATION AND CALCULATION OF THE RELATIVE INCIDENCE OF ACUTE SALPINGITIS IN WOMEN WITH GONORRHOEA

Doctors in Sweden are bound by law to report to public health authorities patients who are diagnosed and being treated for gonorrhoea. We therefore obtained from the files the number of women with gonorrhoea who came from the same central area as those in hospital. This gave us an opportunity to calculate the relative incidence of acute salpingitis in patients with urogenital gonorrhoea (Table 2). The number of women with urogenital gonorrhoea markedly decreased during the period of our study. At the same time the number of patients with acute salpingitis and concomitant urogenital gonorrhoea decreased even more. This decrease was particularly obvious in 1973 and almost significant compared with 1970 ($0.05 > P > 0.01$). However, the relative incidence increased in 1974 to approximately the same level as in 1970.

Table 2 *The yearly number of women in the area studied in whom gonorrhoea was diagnosed and reported and the relative incidence of acute salpingitis in these patients*

Year	Reported gonorrhoea in women			Probability related to 1970
	Total No.	With salpingitis No.	$\frac{w}{o}$	
1970	507	51*	10.6	—
1971	409	35	8.7	$P > 0.05$
1972	307	19	6.2	$P > 0.005$
1973	292	17	5.8	$0.05 > P > 0.01$
1974	226	24	10.3	$P > 0.05$

*Figures not comparable with those given in Table 1 because of correction for the particular area we studied.

YIELD WITH THE GCFT

The yield with the gonococcal complement fixation test (GCFT) in patients with acute gonococcal and nongonococcal salpingitis respectively is shown in Table 3. It will be seen that 40–50% of the patients with gonococcal salpingitis had a positive GCFT in 1970–73 and 83% of them had a positive GCFT in 1974. Table 3 also shows that the yield with the

GCFT in patients with nongonococcal salpingitis increased from 4% in 1970 to 23% in 1974. This increase is highly significant ($P < 0.001$).

Table 3 *The yield with the gonococcal complement fixation test (GCFT) in patients with acute gonococcal or nongonococcal salpingitis*

Year	Patients with acute salpingitis					
	With gonorrhoea			Without gonorrhoea		
	Positive No.	GCFT %	Neg. No.	Positive No.	GCFT %	Neg. No.
1970	25	47	29	3	4	69
1971	15	40	23	9	9	92
1972	13	54	11	11	12	76
1973	7	39	11	17	18	78
1974	25	83	5	33	23	114

Discussion

This investigation showed that the incidence of urogenital gonorrhoea decreased in our area as it did in the whole of Sweden during the first part of the 1970s (Kallings and Moberg, 1977). At the same time the incidence of acute gonococcal salpingitis also decreased and to a greater extent than gonorrhoea in females. If the decrease of gonorrhoea had been due to under-reporting, which was a possible explanation, the incidence of gonococcal salpingitis would have increased. Our findings therefore show that there was an actual decrease in gonorrhoea in Sweden during the first half of the 1970s. This is further supported by the fact that the incidence of urogenital gonorrhoea in patients admitted to hospital with acute salpingitis dropped from nearly 43% in 1970, to approximately 16% in 1973, and to 17% in 1974.

Despite the decrease of gonococcal salpingitis the number of patients with acute salpingitis remained unchanged and even increased during the last year of our study. This increase of nongonococcal salpingitis was in all age groups, and the reasons for it are not clear. It might have been caused by recurrences but our data do not confirm this. Nor can it be explained by other criteria being used for admitting patients with a suspected diagnosis of acute salpingitis as the same criteria were used for the whole investigation. An analysis of the type of contraceptives used showed that more patients used intrauterine devices (IUDs) during 1973–74. Thus, during 1970, 1971, and 1972 respectively only 2.3%, 3%, and 7% of the patients used this type of contraceptive, but in 1973 and 1974 respectively as many as 26% and 29% of the patients had IUDs. Weström *et al.* (1976) noted a higher incidence of acute salpingitis among patients with IUDs. These

circumstances might have contributed to the relative increase of acute nongonococcal and gonococcal salpingitis noted during 1974, but it cannot explain the relative increase of nongonococcal salpingitis during 1970, 1971, and 1972.

It is also tempting to speculate whether the increase could be related to a higher incidence of non-specific urethritis (NSU) in men. Unfortunately, during the period of this study NSU was not reported in Sweden or in other Scandinavian countries. We therefore have no statistics on the incidence of NSU among men although the general impression among Swedish venereologists is that this disease has increased during the 1970s and that it now occurs nearly twice as often as gonococcal urethritis.

We have no data concerning pathogens other than gonococci. It was of interest to note, however, that the positive yield with the GCFT increased among the patients with nongonococcal salpingitis and it was highly significant in 1974 compared with 1970. This increase is not caused by laboratory methods as the same technique for preparing antigens and performing the test has been used for the last 10 years in our laboratory. These findings are interesting from a pathological point of view since it has been proposed by Blinick (1959) that a gonococcal salpingitis could precede infection with other micro-organisms. The increase of positive GCFT results among patients with nongonococcal salpingitis may therefore be due to an earlier gonococcal infection that has preceded invasion with other micro-organisms. In this connection it is of interest to note that the positive yield with the GCFT among patients with gonococcal salpingitis increased from approximately 50% in 1972 and 1973 to 83% in 1974 and at the same time there were more patients with acute salpingitis and gonorrhoea. One could therefore speculate on the possibility of certain gonococcal strains having a greater tendency to induce salpingitis than others. Investigations are now under way to study these suggestions.

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References

- Blinick, G. (1959). Gonococcal disease in the female. *Clinical Obstetrics and Gynecology*, **2**, 492-512.
- Catterall, R. D. (1975). The situation of gonococcal and non-gonococcal infections in the United Kingdom. In *Genital Infections and Their Complications*, pp. 5-13. Edited by D. Danielsson, L. Juhlin, and P.-A. Mårdh. Almqvist and Wiksell International: Stockholm.
- Danielsson, D., Falk, V., and Forslin, L. (1975). Acute salpingitis and gonorrhoea on a gynaecological ward. In *Genital Infections and Their Complications*, pp. 151-156. Edited by D. Danielsson, L. Juhlin, and P.-A. Mårdh. Almqvist and Wiksell International: Stockholm.
- Danielsson, D., and Johannisson, G. (1973). Culture diagnosis of gonorrhoea. *Acta dermato-venereologica*, **53**, 75-80.
- Danielsson, D., Thyresson, N., Falk, V., and Barr, J. (1972). Serologic investigation of the immune response in various types of gonococcal infections. *Acta dermato-venereologica*, **52**, 467-475.
- Falk, V. (1965). Treatment of acute non-tuberculous salpingitis with antibiotics alone and in combination with glucocorticoids. *Acta obstetrica et gynecologica Scandinavica*, **44**, Supplement 6, 1-118.
- Gästrin, B., and Kallings, L. O. (1968). Improved methods for gonococcal sampling and examination on a large scale. *Acta pathologica et microbiologica Scandinavica*, **74**, 362-370.
- Gisslén, H., Hellgren, L., and Starck, V. (1961). Incidence, age distribution and complications of gonorrhoea in Sweden. *Bulletin of the World Health Organisation*, **24**, 367-371.
- Jacobson, L., and Weström, L. (1969). Objectivized diagnosis of pelvic inflammatory disease. *American Journal of Obstetrics and Gynecology*, **105**, 1088-1098.
- Juhlin, L. (1975). The situation of gonococcal and non-gonococcal infections in Sweden and other Scandinavian countries. In *Genital Infections and Their Complications*, pp. 25-28. Edited by D. Danielsson, L. Juhlin, and P.-A. Mårdh. Almqvist and Wiksell International: Stockholm.
- Kallings, L. O., and Moberg, I. (1977). *Epidemiology of gonorrhoea*. In *FEMS Symposium on Gonorrhoea: Epidemiology and Pathogenesis*, London, November 1976, pp. 2-15. Edited by F. A. Skinner, P. D. Walker, and H. Smith. Academic Press: London.
- Mårdh, P.-A., and Weström, L. (1970). Tubal and cervical cultures in acute salpingitis with special reference to *Mycoplasma hominis* and T-strain mycoplasmas. *British Journal of Venereal Diseases*, **46**, 179-186.
- Morton, R. S. (1975). Gonorrhoea; Epidemiological aspects, social aspects. In *Recent Advances in Sexually Transmitted Diseases*, pp. 3-31. Edited by R. S. Morton and J. R. W. Harris. Churchill Livingstone: Edinburgh.
- Rees, E., and Annels, E. H. (1969). Gonococcal salpingitis. *British Journal of Venereal Diseases*, **45**, 205-215.
- Weström, L., Bengtsson, L. P., and Mårdh, P.-A. (1976). The risk of pelvic inflammatory disease in women using intrauterine contraceptive devices as compared to non-users. *Lancet*, **2**, 221-224.
- Wiesner, P. J., and Holmes, K. K. (1975). Current view of the epidemiology of sexually transmitted diseases in the United States. In *Genital Infections and Their Complications*, pp. 15-24. Edited by D. Danielsson, L. Juhlin, and P.-A. Mårdh. Almqvist and Wiksell International: Stockholm.